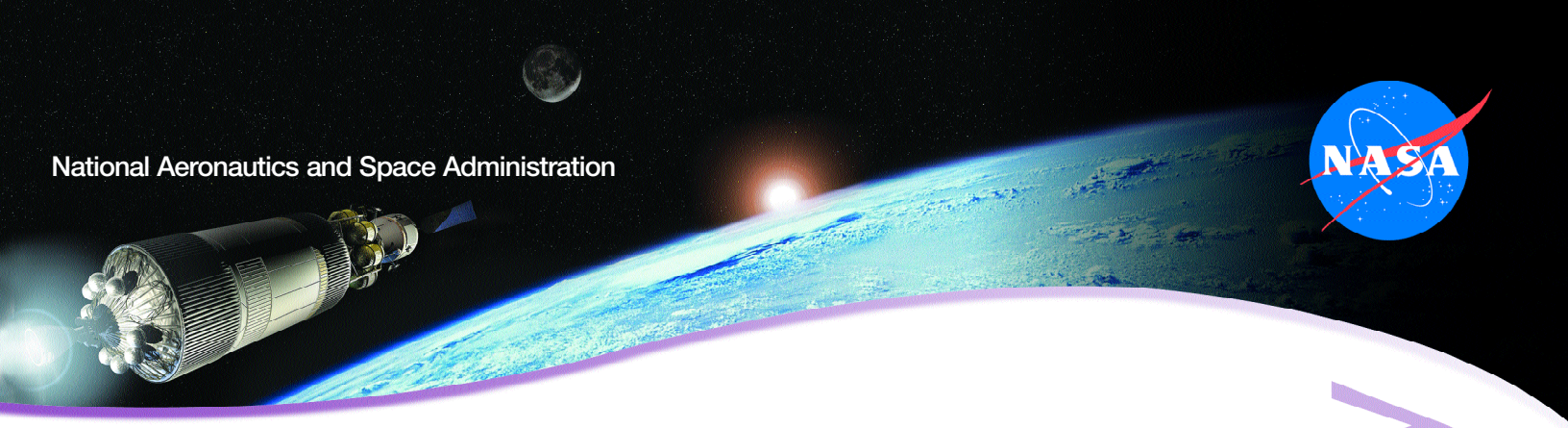

Composite Materials

Advancing the Use of Composites in Spacecraft Design

About Composite Materials Engineering

More than 20 years ago, Goddard engineering managers saw the promise of composite materials in science-instrument design and developed an end-to-end engineering specialty in the field. Today, the Mechanical Systems Division is one of the few government organizations to offer the gamut in composite materials engineering, from design, analyses, fabrication, and assembly to structural verification. The division is now broadening its expertise through Internal Research and Development (IRAD) funding and other partnership efforts to offer solutions geared specifically to human spaceflight and the Constellation program.

Benefits of Composites

Composite materials offer multiple advantages over traditional metallic materials. In science applications, they offer dimensional stability to keep sensitive components properly aligned. In addition, they absorb less radiation, making them ideal for instruments that must measure high-energy sources. For human spaceflight to the Moon and beyond, the advantage is in mass savings and the promise of multi-functional structures. Composite structures can be more than half the mass of aluminum structures, which would result in greater payload capacity for vehicles and spacecraft constructed of these materials.

Capabilities

The division offers end-to-end composite materials engineering, including:

- Concept design
- Detailed design analysis
- Material and process development and verifications
- Fabrication and assembly
- Structural verification

Origins

Over the years, the Goddard engineers have designed, tested, fabricated, assembled, verified, and delivered composite structures for such high-profile missions as the Hubble Space Telescope, Wilkinson Microwave Anisotropy Probe, Gamma-Ray Large Area Space Telescope, Solar Dynamics Observatory, Swift, and ICESat. It currently is developing structures for the James Webb Space Telescope, Global Precipitation Measurement, Magnetospheric MultiScale, and other spacecraft.

Looking Ahead

The division recently won IRAD awards to investigate technologies that specifically benefit the Exploration Systems Mission Directorate. It also has formed a special team to advance the use of composite materials in spacecraft structures and is forming alliances with private industry, other government agencies, and academia to examine potential partnering opportunities.

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